

POWER OUTAGES ON PERFORMANCE OF SELECTED MANUFACTURING FIRMS ON THE GHANA STOCK EXCHANGE

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ABSTRACT

This paper aimed at Power Outages on Performance of Selected Manufacturing Firms on the Ghana Stock Exchange. The paper measured the effect of power outage on the performance of manufacturing firms in Ghana. The population used was all manufacturing companies on the Ghana Stock Exchange for the period 2007-2013. The data was analysed quantitatively, using descriptive statistics, T statistics, averages and standard deviations to make conclusions. It was discovered that ROE (Return on Equity) in power outage and no-power outage years, this difference is not significant and that power outage does not affect ROE of manufacturing firms. Power outage has effect on asset management ratio or asset turnover ratio of manufacturing firms. ROA (Return on Asset ratio) of manufacturing firms is higher in no-power outage periods than power outage periods. The paper concluded that power outages in the short run, do not explain much of the gap in productivity, and that manufacturing firms in the long run may be affected by power outages.

Keywords: Performance, power, manufacturing companies, Ghana.

1. INTRODUCTION

Power is an essential commodity because every sphere of life is affected by it. Emerging economies especially need constant availability of power since it is fundamental for national development. Most of the operations carried out for example in Ghana depends on power. Power is needed by the mining sector, service providers (sector) and the manufacturing industry in order to carry out their operations. Industries, families, civil society, individuals and the state as a whole will be affected as a result of unavailability of electricity (Adjei-Mantey, 2013). A short or long-term loss of electric power to an area can be termed as power outages (also called power failure, power cut or power blackout). There are many causes of power failure in an electricity network, fault at power stations, damage of electric transmission lines, substations or other parts of distribution system and overloading of electric mains are some examples of such causes. Sites where public safety and the environment are at risk are particularly critical to power outages. Manufacturing is being put to the sword over the last seven (7) years due to the lack of conscious effort. Contribution of the manufacturing industry in 2006 to Ghana's GDP (Gross Domestic Product) was 10.2%, it reduced in 2010 to 6.8% and reduced in 2011 to 6.7%. This reduction in GDP can be attributed to unreliable power supply (www.ghanaweb.com).

Many firms are often not aware of the true costs and impact that outages have on their operations because they are mostly not prepared for business disruption caused by power blackouts (Bruch & Hunter, www.agcs.allianz.com). Energy (electricity) supply in Ghana has not been reliable despite its importance to many industries and the household. Power usually goes off often without prior notification from the Electricity Company of Ghana (ECG) to its customers. The most affected industry by this frequent power outages is the manufacturing

industry. The manufacturing industry because of the persistent erratic power supply in the fourth quarter of 2014 suffered a dipping growth of unprecedented negative 8% eroding confidence in the business society. AGI's (Association of Ghana Industries) president, warned in a communiqué that Ghana risks losing its industrial base if government policies do not quickly address the challenge of power outages in order to revive the sector because the manufacturing sector continues to shrink (Laary, 2015). Hence this study looks at the effect of power outages on performance of selected manufacturing firms on the Ghana Stock Exchange. Most research on effect of power outages was conducted on medium and SMEs like Asamoah & Doe (2014), Amponsah & Barimah (2012) and Cissokho1 & Seck (2013) and many researchers estimated cost of power outage to firms by using data on backup generators. This paper will fill the gap by providing adequate results by analyzing the effects of electricity outages on performance of manufacturing sector in Ghana by quantifying the magnitude of the problem. This is important because while policymakers and government are well aware that shortages are a problem, quantifying the losses from this, empirically is less established in the context of developing country like Ghana.

2. LITERATURE REVIEW

2.1 Measurement of Performance

There are two broad approaches (methods) used to measure performance, the accounting approach, which makes use of financial ratios and econometric techniques. Accounting methods which are traditionally based on the use of financial ratios have been employed for assessing firm's performance. Advances in management sciences have led to the development of other methods such as non-parametric (DEA) and parametric Stochastic Frontier Approach (SFA) (Berger & Humphrey, 1997). The idea of measuring performance is to draw a line between firms that are performing well from those which are doing poorly (Delen, Kuzey, & Uyar, 2013).

2.2 Analysis of Performance in Accounting

There are three techniques use in analyzing firm's performance with respect to accounting, which are horizontal, vertical and ratio analyses. Data for the financial statement analysis can be found in organization's statement of comprehensive income, statement of financial position, and cash flow statement. These data are easily accessible through the investor relation sections of all firms listed on the stock exchange (Schönbohm, 2013).

2.3 Energy use in Ghana

The main sources of power in Ghana consist of electricity, fossil fuels and biomass; locally, energy production is mainly obtained from biomass sources, hydroelectric dams, thermal electric plants and Sun (solar energy). In order to meet the country's power demand, electricity, fossil fuels and crude oil are imported to support the primary indigenous power production. This energy is supplied to the various non-economic and economic sectors of Ghana, which is made up of the Industrial, Residential, Agricultural and Fisheries, Commercial & Services, and Transport Sector. In 2004, it was estimated that solar accounted for 0.1%, electricity accounted for 6%, fossil fuels accounted for 27% and biomass accounted for 66.9% of total energy supply in Ghana; corresponding to a net total of 7.1 million TOE (Tonnes of Oil Equivalent) (Energy Commission Ghana, 2006). For the past years Ghana has been experiencing frequent power outage. In the 2013 World Bank Enterprise Survey on African countries, including Ghana and Nigeria, it named the on-going rampant poor electricity supply as one of the biggest barriers, hindering the growth of the countries' economy, and preventing or discouraging many multinational investors. Unreliable power supply has been the main potential contributor to the large productivity gap between

developed and developing countries. Insufficient and unsustainable power supply is a major problem in Ghana today (Boasiako, 2014).

2.4 The Manufacturing Sector

The manufacturing industry, though not strong as it should be, continues to play a respectable role in Ghana's economy, contributing about 9% (0.09) to GDP (Gross Domestic Product). Ghana's most important manufacturing industries include aluminum smelting, agro-food processing, oil refining and cement. Other sectors include the manufacturing of pharmaceuticals, chemicals, paints, beverages, glass, plastics, textiles, and apparel, and the processing of wood and metals goods. The manufacturing sector provides employment for an estimated workforce of over 250,000 citizens. About 25,000 companies are registered. More than 80% (0.80) of firms registered are small size enterprises with less than 50 workers, while it is estimated that 55% (0.55) of all enterprises are located within the Greater Accra/Tema Region. The manufacturing industry recorded a growth of 5% (0.05) in 2009 compared to 4% (0.04) in 2008, which means there was an increment of 1% (0.01). Nevertheless, the contribution of Ghana's manufacturing sector to overall growth is still marginal. The Ministry of Trade and Industry is the primary Government agency with the overall mandate of formulating, developing, implementing, monitoring and evaluating trade and industry policies in the country. The Ministry is also the advocates for the private sector within government and is the major agency responsible for monitoring the implementation the Government's private sector development activities and programs (www.natcomreport.com). The manufacturing sector primarily produces and provides services not only to the local Ghanaian economy but also to the West Africa sub-region at large; and some semi-processed products are exported internationally to raise capital (Apeaning, 2012). The reduction in growth or efficiency of the manufacturing industry in Ghana can be attributed to the poor electricity supply in the country. The manufacturing firms such as Accra and Kumasi Breweries, Guinness Ghana Ltd, Ghacem Ltd, and many other companies which require 24 hour power supply, in recent times have been experiencing more than 12 hours and sometimes 24hrs power failures intermittently in a week for the past 3 years (Boasiako, 2015).

Manufacturing firms because according to AEA statistics, the industrial sector is the largest consumer of electricity in Ghana, and also electricity represents the largest form of energy used in the industrial sector. Based on this one can conclude that the manufacturing industry will be mostly affected by power outages.

2.5 Empirical Review

Analysis of the relationship between the energy sector and economic development though scanty started since the middle of the 19th century. The 1970s energy crisis however fueled the interest of the relationship between the energy sector and economic development which increased the study of energy costs as a whole (Jiang, Chen & Zhou, 2011). Energy or power in the 21st century is still very important for economic activities, in that the energy resource of a country determines the economic growth of that country (Velasquez & Pichler, 2010).

Electricity and business has a symbolic relationship (Velasquez & Pichler, 2010). The reason being that, it is used for different purposes ranging from production, storage, powering of equipment and display of product. The use of electricity consequently serves as input for production and a critical resource needed to make products. Electricity is therefore an essential commodity for all industries, including the manufacturing, service and distribution. Enormous amount of electricity is used by many sectors like manufacturing and transport for

operation processes including storage and production. Electricity as a transformed unity in this respect serves as a commodity (Haanes et al, 2011). Ohio, Connecticut, Michigan, Vermont, Massachusetts, and New York all in the United States in August 14, 2003 experienced blackout that caused an estimated loss of \$6.4 billion (Anderson & Geckil, 2003). Bental & Ravid (1982) researched on a simple method for evaluating the marginal cost of unsupplied electricity and assumed the cost of power outage to organizations using data on backup generators. It was the first study to indicate the cost of power outages to organizations. It was also estimated that decision makers act rationally and hedge by investing in backup generating plants in order to ensure themselves against part or total damages that can result from power outage or electricity failure. It was also assumed in their study that corporations are competitively risk neutral, and will equate at the margin, (the expected cost of self-generation of a kWh to the expected benefit from that kWh). Marginal cost of unsupplied electricity for Israel and the US was measured. The study incorporated risk aversion phenomenon in computing cost of power outages and also differentiates between absolute, unmitigated costs, and mitigated cost of power outages. Findings from the research paper indicated that the cost of power outage varies proportionally with reliability (low power outage time). US's (United State) reliability is higher than that of Israel where reliability is lower but power outage cost tends to be higher in the US. Beenstock (1991) stated that there should be a refinement of the methodology proposed by Bental & Ravid (1982). Bental & Ravid (1982) said customers would be prepared to invest in backup as service becomes less reliable but would face a discontinuity (stop operating) at a point when risks associated with additional loss of service appear to be unimportant.

Tambunan (2009) investigated on SME in Asian developing countries and found that power among the many obstacles to development of SMEs was mentioned by 62% of the 180 respondents used for the studies as being the prime obstacle to the development of SMEs. Deficiency accounted to 21%, sales limitation was 36%, deficiency was 21% and high production capacity accounted for 25% in the same studies. Burlando (2010) wrote on the impact of electricity on work and health: evidenced from a blackout in Zanzibar. Researcher established that, the large reduction in household income among those employed in organizations that required electricity for their operation was as a result of a month-long power outage in Zanzibar a town in Tanzania. Production hours or work hours had to be reduced for workers relying on electricity in order to perform their task by an average of 8% per day during blackout period.

Amponsah & Braimah (2012) investigated the causes and effects of the frequent and unannounced blackouts on the operations of MSI in Kumasi. A sample of 320 MSI from three industrial clusters within Kumasi Metropolis were interviewed, seven institutions and two groups of apprentices. The research showed that MSI require constant supplies of power for their activities and that power plays a major role in MSI's operations in Kumasi. The study for example, identified that cold stores need 168 hours, grinding mills need 70 hours, wood processing firms require 60 hours and printing presses require about 46.2 hours, of constant supply of power per week, sachet water producing firms need 37.2 hours, straightening and welding firms required 36 hours, spraying firms need 33, and dressmaking firms require 32.4 hours constant supply of power per every week for their operations. Meanwhile electricity supply in the country (Ghana) has lagged behind demand (less supply than demand). Researchers also recorded a 5.3% reduction in the quantity of power consumed by the MSI as against what they required for uninterrupted activities. Lack of alternative source of power during blackout hours rendered about 44% of workers of the MSI redundant (idle). They proposed that the ever-increasing consuming population is as a result

of supply deficit, which can be confirmed in an analysis by GridCo of the total installed power capacity and that total power demand shown a supply deficit of about 9GWh. Researchers argued that adequate and reliable power supply in Ghana is held by the supply-side. Writers are of the view that the government should invest in power subsector in order to supply and generate the amount of power needed to address the interruptions in electricity (power). This recommendation was made because researchers believe that one of the key factors of ensuring sustained decrease in poverty in middle income economies like Ghana is reliable electricity (power). Other recommendations made were Ghana's wind resources (which is confirmed by the coastline and the Ghana-Togo border with favorable wind velocities of between 6-7 m/s) should be harnessed to supplement capacity of power; landfill potential can be harnessed to augment electricity generation in Ghana; Ghanaians should exploit the potential sources of electricity towards the diversification of the country's power generation mix; the daily waste of 1200 tonnes generated in Kumasi Metropolitan assembly is a potential for generating between 30 and 52 MW of electricity to support national electricity generation capacity; potential of mini and small hydro power sites which are dispersed over 70 sites in Ghana (and capable of generating about 25 MW) could be explored to support Ghana power supply; and the two million tons of wood residues present in the country should also be harnessed for electricity generation. Asamoah, & Doe (2014) researched on the Effect of Power Fluctuations on the Profitability and Competitiveness of SMEs within the Accra Business, conclusions drawn from the studies was SMEs suffer from often power fluctuations (those not announced and those announced) particularly those in Accra. ROA (Return on Asset) and ROI (Return on Investment) are adversely affected as a result of the power fluctuations, leading to profit loss. Storage, production and service delivery are the main areas affected by power fluctuations. Increased cost in outsourced repair services, increased cancelled orders due to delays, and expenditure on alternatives sources of electricity are some examples of cost incurred by corporations due to power failure. Asamoah & Doe are of the same view with Wang (2002) and other several scholars that profitability of SMEs is severely affected by the frequent and intermitted power outages. Allcott, Collard-Wexler, & O'Connell (2015) investigated on How Do Electricity Shortages Affect Industry? Evidence from India, by pinpointing lack of reliable electricity supply in India as a stark example of how poor infrastructure can affect economic development. The study assumed effects of shortages on manufacturing using archival data on shortages, instrumenting for shortages with supply shifts from newly constructed power plants and hydro availability. The studies listed four major findings. Firstly Shortages affect productivity much less than they affect sales because plants also decrease inputs in response to shortages, this is because to researchers at least in the short run power failure alone do not account much for the productivity gap between companies in developing versus developed states examined by Chang-Tai & Klenow (2009), Banerjee & Duflo (2005) and Hall & Jones (1999). Secondly there are substantial economies of scale in generator costs shortages, shortages severely has effect on small plants because power shortages strongly affects plants without generators (backups). Thirdly it was found that sales was decreased by 5.6% to 8.6% for the average plant in the short run because they assumed that shortages are substantial drag on Indian manufacturing average plant producer surplus which reduced by 9.5% of which 3.9% is contributed to the capital cost of generator backups. Fourthly or lastly though some potential solutions to India's power outages problem may be politically infeasible, policies can help.

3. Methodology

The population used was all twelve (12) manufacturing companies on the Ghana Stock Exchange for the period 2007-2013. The data was analysed quantitatively, using descriptive

statistics, T statistics, averages and standard deviations to make conclusions. A sample of ten (10) manufacturing firms representing 83.33% of the population was used. Selected organizations were Benso Oil Plantation, PZ Cousin, Ghana Cocoa Processing Limited, Fanmilk Ghana Ltd, Unilever Ghana Ltd, Pioneer Kitchen Ware Company Ltd, Starwin Products Limited (SPL), Ayrton Drug Manufacturing Limited, Aluworks Limited, and African Champion Industries Limited.

4. Results and Discussion

The table and the figure below shows the effect of power outage on the performance of selected manufacturing companies listed on the Ghana Stock Exchange.

Table 4.1: Profitability of manufacturing firms during power outage and no-power outage periods

Profitability Indicators	Mn (P.Out)	Mn (N-P.Out)	Std D. (P.Out)	Std D. (N-P.Out)	TL (P.Out)	TL (N-P.Out)	P-Value	Decision
O.P Margin	0.0665	0.0533	0.1426	0.1673	-0.0043	-0.0093	0.3736	reject
ROA	-0.0269	0.0448	0.2825	0.1647	-0.016	-0.0114	0.1219	reject
ROE	-0.491	-0.1517	2.9742	2.0391	0.0445	0.0314	0.3073	reject

Source: Secondary data, July 2017

Note: Mn=Mean; P.Out= Power Outage period; N-P.Out= No-Power Outage period; Std D.= Standard Deviation; TL= Trendline; Sig=Significance Value; O.P. Margin= Operating Profit Margin; ROA= Return on Asset; ROE= Return on Equity; Significance level: P-Value < 10%

Company's profit performance is measured using profitability ratios. Looking at the first profitability ratio (operating profit margin), power outage period recorded a mean of 0.0665, standard deviation of 0.1426, and a trendline of -0.0043. Trendline of -0.0043 means over the years of power failure (outage) operating profit margin will reduce by 0.43%; while no-power outage period recorded a mean of 0.0533, a standard deviation of 0.1673, and a trendline of -0.0093. So, over the period of no-power outage operating profit margin will reduce by 0.93%. Operating Profit Margin recorded a significance value of 0.3736. ROA during power outage period noted a mean of -0.0269, a standard deviation of 0.2825 and a trendline of -0.016. Which implies over the period of power outage ROA (Return-on-Assets) will experience a reduction of 1.6%; whereas no-power outage period noted average of 0.0448, standard deviation of 0.1647 and a trendline of -0.0114. So over the years of no-dumsor ROA will decrease by 1.14%. 0.1219 is recorded significance value for ROA. With respect to ROE (Return-on-Equity) mean for power outage period was -0.4910, standard deviation of 2.9742 and a trendline of 0.0445, which means over the period of power outage ROE will increase by 4.45%; while ROE for no-power outage period recorded a mean of -0.1517, standard deviation of 2.0391 and trendline of 0.0314. This implies no-power outage ROE over the period will increase by 3.14%. ROE for manufacturing firms doted a significance value of 0.3073.

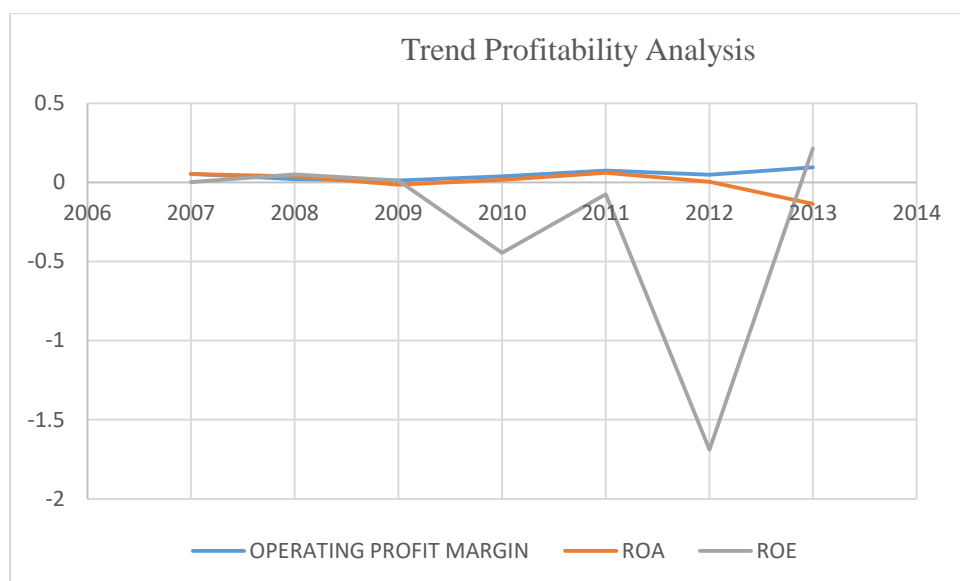


Figure 4.1: Profitability of manufacturing firms during dumsor and non-dumsor periods

Figure 4.1 as well provides a pictorial view of the trends in the manufacturing industry profitability in Ghana from 2007 to 2013 hiring three (3) different measures for manufacturing industry profitability specifically: operating profit margin, return-on-asset and return-on-equity. From the above plotted profitability graph, operating profit and return-on-asset decreased in 2008 but that of return-on-equity improved in 2008. All three profitability measures reduced in 2009, improved in 2010 with the exception of return-on-equity. From the manufacturing sector profitability trends, it appears all profitability measures massively improved in 2011 (no-power outage year). However, all three (3) profitability measures drastically decreased in 2012 (power outage year). In 2013 Ghana's manufacturing sector recorded improvement in operating profit margin and return-on-equity but a reduction in return-on-asset. This can be that during that period assets or machines were idle because of the frequent power outage in 2012. With regards to the second objective question, power outage periods has operation profit margin mean of 0.0132 higher than that of no-power outage years, no-power outage period deviates from it operating profit margin more than that of power outage years, and a significance value of 0.3736 higher than 0.1 means, it is not significance and that power outage has no effect on operating profit margin of manufacturing firms. ROA is high in no-power period than power outage period and that in terms of ROA there is a reduction in power outage years, power outage periods deviates from its ROA 0.1178 more than how much no-power outage deviates from its ROA, and also a significance values of 0.1219 is higher than the level of significance of 0.1 and that power outage has no effect on ROA of manufacturing firms even though it has a high mean in no-power outage as compared to power outage periods. Power outage years have a lesser ROE as compared to that of no-power outage, but power outage periods deviates much from its standard deviation as compared to no-power outage years. So in terms of return on equity manufacturing firms during power outage periods do not perform. Significance value of 0.3073 indicates that even though there is a difference with respect to ROE in power outage and no-power outage years, this difference is not significant and that power outage does not affect ROE of manufacturing firms.

5. CONCLUSION

Energy resource of the country can determine economic growth and development, as such power is essential for economic activities. Power as an input commodity for production is a very important commodity. By critically examining the liquidity ratios for both periods. Though the means for power outage periods are higher and indicates that firms are more liquid in power outage years, and also significance value shown that power outage does not affect liquidity. Researcher deduced that by looking at the standard deviations, power outage years deviated much from its means, also the trendline or rate of change (reduction) in power outage years are higher, so do agree with Allcott, Collard-Wexler & O'Connell (2015) that power outages alone in the short run, do not explain much of the gap in productivity and concludes that manufacturing firms in the long run can be affected by power outages. The most striking result was that though manufacturers said power outage has affected profitability, the research shown that it is not significant.

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